

RECEIVED *V/S*  
SUPREME COURT  
STATE OF WASHINGTON  
10 JUN 28 PM 2:53

No. 83030-4

BY RONALD R. CARPENTER

SUPREME COURT OF THE STATE OF WASHINGTON

CLERK *1/3*

TWIN COMMANDER AIRCRAFT, L.L.C., formerly known and doing  
business as TWIN COMMANDER AIRCRAFT CORPORATION,  
Petitioner

v.

KENNETH C. BURTON, as Personal Representative of the ESTATE OF  
ULISES DESPOSORIOS SANTIAGO, and on behalf of ERIKA  
BARAJASA VASQUEZ, VIRGINIA DESPOSORIOS BARAJAS,  
ULISES DESPOSORIOS BARAJAS, TEOFILO UVALDO  
DESPOSORIOS CABRERA, and IRENE SANTIAGO NAVA,

KENNETH C. BURTON, as Personal Representative of the ESTATE OF  
MARCELINO GONZALEZ ALCANTARA, and on behalf of ROSARIO  
FLORES ALVARADO, EDUARDO GONZALEZ FLORES, DANIEL  
GONZALEZ FLORES and CHRISTIAN NANYELI GONZALEZ  
FLORES,

KENNETH C. BURTON, as Personal Representative of the ESTATE OF  
JUAN GALINDO HERRERA, and on behalf of REBECA ESCAMILLA  
MAGALLANES, ERICK GALINDO ESCAMILLA and LILLIAN ITZE  
GALINDO ESCAMILLA,

KENNETH C. BURTON, as Personal Representative of the ESTATE OF  
PABLO LOZADA LEGORRETA, and on behalf of MARIA DE  
LOURDES ESQUIVEL AVALOS, GERSON FABRICIO LOZADA  
ESQUIVEL, DIANA PAOLA LOZADA ESQUIVEL and PRISCILLA  
LOZADA ESQUIVEL,

KENNETH C. BURTON, as Personal Representative of the ESTATE OF  
CESAR GABRIEL MAYA, and on behalf of STEPHANIE  
GUADALUPE MAYA TRIUJEQUE and DIEGO HANNIEL MAYA  
TRIUJEQUE,

KENNETH C. BURTON, as Personal Representative of the ESTATE OF  
JESUS ARCINIEGA NIETO, and on behalf of ANGELICA

ORIGINAL

MARGARITA ARIZMENDI GUADARRAMA, ESTEFANIA  
ARCINIEGA ARIZMENDI, JOSE FRANCISCO ARCINIEGA PEREZ  
and CONSUELO NIETO TAPIA, and

KENNETH C. BURTON, as Personal Representative of the ESTATE OF  
MARIANELA ELIZARDI RIOS, and on behalf of MARIANELA AIDA  
QUEZADA ELIZARDI and AIDA MAGDALENA RIOS DE  
ELIZARDI, Respondents

---

RESPONDENTS' REVISED STATEMENT OF ADDITIONAL  
AUTHORITY

---

Gene S. Hagood, SBT 08698400  
Thomas W. Bingham, WSBA 7575  
Attorneys for Respondents

Gene S. Hagood  
Hagood, Neumann &  
Huckeba, LLP  
1520 E. Highway 6  
Alvin, Texas 77511  
Telephone: 281-331-5757  
firm@hnhlawyers.com

Thomas W. Bingham  
Kerry V. Kovarik  
Krutch, Lindell, Bingham,  
Jones & Petrie, P.S.  
1420 Fifth Ave., Suite 3150  
Seattle, Washington 98101  
Telephone: 206-682-1505  
twb@krutchlindell.com

## **TABLES**

### **Table of Contents**

I.	INTRODUCTION. ....	1
II.	ISSUES. ....	1
III.	ADDITIONAL AUTHORITIES. ....	2
A.	<i>Avco Corp. v. Neff</i> . ....	2
B.	<i>Definitions of Stabilators and Horizontal Stabilizers</i> ....	3
C.	<i>Aeronautical Definition of "Flutter"</i> . ....	4
D.	<i>Advisory Circular 20-114 Reporting Requirements</i> . ....	4

### **Cases**

<i>Avco Corp. v. Neff</i> , Case No. 1D09-5531, Case No. 1D09-5548, Court of Appeals Florida, First District, 30 So. 3d 597; 2010 Fla. App. LEXIS 2960; CCH Pod. Liab. P18, 382; 35 Fla. L. Weekly D 541, March 10, 2010, Opinion Filed, Released for Publication March 26, 2010. . . .	1, 2, 3
<i>Frank v. Fischer</i> , 46 Wn. App. 133, 730 P.2d 70 (1986). ....	1

### **Other Authorities**

Dictionary of Aeronautical Terms, 3 <sup>rd</sup> Ed. ....	2, 3, 4
FAA Advisory Circular 20-114. ....	2, 4, 5
Pilot's Handbook of Aeronautical Knowledge. ....	2, 3
RAP 10.8. ....	1
Twin Commander 690C's Maintenance Manual. ....	2, 4
Washington Practice Vol. 3, Tegland. ....	1

## I. INTRODUCTION

RAP 10.8, allows parties to alert the Court to new and relevant case law, and authorizes parties to call the Court's attention to important additional authorities not addressed during briefing (*Washington Practice*, Vol. 3, RAP 10.8, p. 107-8; *Frank v. Fischer*, 46 Wn. App. 133, 730 P.2d 70 (1986), *aff'd*, 108 Wash.2d 468, 739 P.2d 1145 (1987)).

Respondents previously filed Statement of Additional Authority was rejected by the Clerk as containing impermissible argument. Respondents are submitting this Respondents Revised Statement of Additional Authority after having deleted all argument and citations to the record. Pursuant to RAP 10.8 this statement of additional authorities is limited to the submission of the additional authority and a statement of the issue on which the additional authority is offered.

## II. ISSUES

Additional authority is submitted to the Court by Respondent on the following issues:

(1) **New and relevant case law:** Respondents call the Court's attention to *Avco v. Neff*, CASE NO. 1D09-5531, CASE NO. 1d09-5548, Court of Appeals Florida, First District, 30 So. 3d 597; 2010 Fla. App. LEXIS 2960; CCH Pod. Liab. P18, 382; 35 Fla. L. Weekly D 541, March 10, 2010, Opinion Filed, Released for Publication March 26, 2010;

**(2) Important additional authority:** Respondent provides citations to The Pilot's Handbook of Aeronautical Knowledge, The Dictionary of Aeronautical Terms (3<sup>rd</sup> Ed.), and the Twin Commander 690C Maintenance Manual on the issue of whether Twin Commander 690C model aircraft are equipped with "stabilators";

**(3) Important additional authority:** Respondent provides citations to The Dictionary of Aeronautical Terms (3<sup>rd</sup> Ed.) addressing the aeronautical definition of "flutter" and is relevant to the issue of accident causation; and

**(4) Important additional authority:** Respondent provides additional sections of FAA Advisory Circular 20-114, § 3.c on the issue of whether Twin Commander had an affirmative duty under FAA Advisory Circular 20-114 to report to the FAA all corrections, deficiencies, and safety hazards in their products which reasonably appear to be potential airworthiness directive subjects.

### **III. ADDITIONAL AUTHORITIES**

#### **A. Avco Corp. v. Neff**

Avco v. Neff, CASE NO. 1D09-5531, CASE NO. 1d09-5548, Court of Appeals Florida, First District, 30 So. 3d 597; 2010 Fla. App. LEXIS 2960; CCH Pod. Liab. P18, 382; 35 Fla. L. Weekly D 541, March 10,

2010, Opinion Filed, Released for Publication March 26, 2010.

This case is relevant to the issues of whether the GARA 18 year limitation period creates an immunity for aviation manufacturers from the burdens of defending a suit, or rather is more akin to a statute of limitations, creating affirmative defenses on which the defendant manufacturer has the burden of proof.

***B. Definitions of Stabilators and Horizontal Stabilizers***

The following authorities are relevant to the issue of whether Twin Commander 690C aircraft are equipped with “stabilators” or “horizontal stabilizers.”

The Pilot’s Handbook of Aeronautical Knowledge establishes the difference between “stabilators” and “horizontal stabilizers” on any given aircraft (*See* Figures 1-7; 1-8 attached as Exhibit A)).

The Dictionary of Aeronautical Terms (3<sup>rd</sup> Ed.) defines the terms “elevator,” “stabilizer” and “stabilator” as follows:

**elevator** (airplane control). The horizontal, movable control surface in the tail section, or empennage, of an airplane. The elevator is hinged to the trailing edge of the fixed horizontal stabilizer. Moving the elevator up or down, by fore-and-aft movement of the control yoke or stick, changes the aerodynamic force produced by the horizontal tail surface (p. 193);

**stabilizer** (airplane control surface). The fixed horizontal

tail surface on an airplane. The stabilizer is set on the airplane so it provides the correct amount of stabilizing downward aerodynamic force when the aircraft is flying at its normal cruise speed. The elevators are hinged to the trailing edge of the stabilizer (p. 486);

and

**stabilator** (aircraft primary flight control). A single-piece horizontal tail surface on an airplane which serves the purposes of both the horizontal stabilizer and the elevators. A stabilator must have some method of decreasing its sensitivity, and this is done with an antiservo tab on its trailing edge. The antiservo tab automatically moves in the same direction as the stabilator, and the aerodynamic force it produces opposes the movement of the stabilator. (p. 485)

(Attached as Exhibit B)

Exhibit C, is a page from the Twin Commander 690C Maintenance Manual diagramming the tail section of the 690C.

**C.      *Aeronautical Definition of “Flutter”***

The Dictionary of Aeronautical Terms (3<sup>rd</sup> Ed.) Defines “flutter” (p. 223) as the:

Rapid and uncontrolled oscillation of a flight control surface on an aircraft caused by a dynamically unbalanced condition. Flutter normally causes the loss of the control surface and a crash.

**D.      *Advisory Circular 20-114 Reporting Requirements***

FAA Advisory Circular 20-114, partially cited in Petitioner’s Supplemental Brief, is attached in its entirety as Exhibit D. The additional

Supplemental Brief, is attached in its entirety as Exhibit D. The additional submitted sections from FAA Advisory Circular 20-114 are relevant to the issue of Twin Commander's duties to report to the FAA. Additional sections of FAA Advisory Circular 20-114 relevant to this issue are as follows:

c. . . . however, manufacturers are required by FAR to gain FAA approval of all major type design changes and to provide operators with descriptive data covering required design changes to their products.

d. When major type design changes are involved, FAA approval is required by either FAA regional engineering offices or FAA designees . . . The following are examples of major type design changes that fall in this category: . . .

(5) Changes made to correct reported deficiencies or safety hazards which appear to be airworthiness directive subjects.

RESPECTFULLY SUBMITTED this 28th day of June, 2010.

KRUTCH, LINDELL, BINGHAM, JONES &  
PETRIE

By: 

Thomas W. Bingham, WSBA #7575

Kerry V. Kovarik, WSBA #40831

Attorneys for Appellants

HAGOOD, NEUMANN, & HUCKEBA, L.L.P.

By:  FOR

Gene S. Hagood

Foreign Counsel for Appellants



CERTIFICATE OF SERVICE

On Monday, June 28, 2010, I certify that I served  
RESPONDENTS' REVISED STATEMENT OF ADDITIONAL  
AUTHORITY on:

(Via Hand Delivery)

Mr. Clark Reed Nichols

Ms. Mary P. Gaston

Perkins Coie

1201 Third Avenue, Suite 4800

Seattle, WA 98101-3099

*Attorney, Petitioner Twin Commander Aircraft LLC*

Dated this 28<sup>th</sup> day of June, 2010.

By 

Kerry V. Kovarik, WSBA #40831

KRUTCH, LINDELL, BINGHAM,

JONES & PETRIE, P.S.

1420 Fifth Avenue, Suite 3150

Seattle, WA 98101

*Local Attorney for Respondents*

CLERK

BY RONALD R. CARPENTER

10 JUN 28 PM 2:53

RECEIVED  
SUPREME COURT  
STATE OF WASHINGTON

## **Exhibit A**



U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

# Advisory Circular

**AC 20-114**

**DATE: 10/22/1981**

AC 20-114

## MANUFACTURERS' SERVICE DOCUMENTS

Initiated by: AWS-110

Date: 10/22/81

1. **PURPOSE.** This advisory circular suggests acceptable methods by which product manufacturers may indicate Federal Aviation Administration (FAA) approval of recommended actions prescribed in manufacturers' service documents.
2. **RELATED FEDERAL AVIATION REGULATION (FAR) SECTIONS.** Sections 21.31, 21.93, 21.95, 21.97, 21.99, 21.113, 21.289, 21.463, 43.13(a)&(b), 43.3(a), 43.7, 43.17, 65.95, 91.163(b), 121.379, 127.140, 135.437, and 145.51.
3. **BACKGROUND.**
  - a. Manufacturers' service documents communicate useful recommendations and information on available alterations, suggested repairs, inspections, etc., to operators. It is the operators' (not the manufacturers') ultimate responsibility to ensure that FAA approval has been obtained if FAA approval is required before implanting manufacturers' advice, recommendations, alterations, repairs, etc., prescribed in service documents. The FAR requires manufacturers to provide descriptive data covering required design changes to operators of their products. When FAA approval is required, it is necessary for operators and FAA field inspectors to know which recommendation or information has been reviewed and approved by the FAA upon issuance of the service document. For this reason it is desirable and expedient to assist the operator by indicating in an appropriate fashion in the body of service documents specifically which recommendation or information has been reviewed and approved by the FAA.
  - b. In the past, the phrases "FAA/DER Approved," "DER Approved," and "DOA Approved" have been used in service documents to indicate that FAA approval was administered by FAA designees. Such notations introduce confusion regarding the FAA approval status of a recommended action. FAA designee approval has legal significance only when that approval constitutes an FAA

approval. Therefore, an approval by an FAA designee on behalf of the FAA that is accomplished within that designee's delegated authority is an FAA approval. FAA designees can approve only actions that have a regulatory basis for approval.

- c. It is common practice for manufacturers to publish service documents for distribution to operators of their products. Manufacturers are not required by FAR either to coordinate service documents with the FAA or to gain FAA approval of these service documents prior to publication or distribution; however, manufacturers are required by FAR to gain FAA approval of all major type design changes and to provide operators with descriptive data covering required design changes to their products.
- d. When major type design changes are involved, FAA approval is required by either FAA regional engineering offices or FAA designees as defined in paragraph 4c. The following are examples of major type design changes that fall in this category:
  - (1) Changes requiring issuance of a Type Inspection Authorization.
  - (2) Changes requiring ground test demonstrations witnessed by FAA regional engineering personnel.
  - (3) Changes requiring revisions to Type Certificate Data Sheets.
  - (4) Changes requiring revisions to the Airworthiness Limitation Sections of FAA-approved manuals.
  - (5) Changes made to correct reported deficiencies or safety hazards which appear to be airworthiness directive subjects.
  - (6) Revisions to changes required by airworthiness directives.
- e. It has also been common practice in the past for manufacturers to mark entire service documents, such as service bulletins and all-operators' letters, as "FAA-Approved," "FAA/DER Approved," or "DER Approved." This practice implies that the service document has been reviewed, evaluated, and approved in total by the FAA. However, since there is no regulatory basis for FAA approval of certain information in service documents, only the type certification data should be indicated as FAA Approved. A single statement to this effect should be included on the appropriate page of this document.
- f. FAA approval of a document or recommended action should mean that the FAA (or a designee) has reviewed the document or has recommended action under established FAA regulations or standards and found it to be acceptable. Many parts of typical service documents do not require and should not

receive FAA approval; these parts include manufacturer's recommended compliance times (except as indicated in paragraphs 5b(1)(b) and 5c), reasons or background supporting issuance of the document, recommended maintenance practices, step-by-step routine alteration procedures, estimates on the cost of compliance, tooling and facility requirements for compliance, etc. When there is a regulatory basis for an FAA approval, FAA approval may be indicated.

- g. Most manufacturers of products used in air carrier service and many manufacturers of products used in general aviation have elected to abide by the guidelines in Air Transport Association (ATA) Specification No. 100, Specification for Manufacturers' Technical Data or General Aviation Manufacturers Association (GAMA) Specification 2.

Use of ATA Specification No. 100 or GAMA 2 is not an FAA requirement; however, it is a useful industry specification and its use is acceptable to the FAA. These Specifications and an associated Airline/Manufacturer Service Bulletin Implementation Guideline Manual, IGM-1, can be used to the extent they are compatible with the discussion that follows. (Note: ATA Specification No. 100 and IGM-1 may be purchased from the Engineering Division, Air Transport Association, 1709 New York Avenue, N.W., Washington, D.C. 20006.) GAMA-2 Specification may be purchased from: General Aviation Manufacturers Association, Suite 517, 1025 Connecticut Avenue, N.W., Washington, D.C. 20036.

#### 4. DEFINITIONS.

- a. "Product" means an aircraft, aircraft engine, propeller, appliance, or part thereof.
- b. "Service documents" mean publications by a type certificate holder or appliance or component manufacturer that communicate useful information relative to safety, product improvement, economics, and operational and/or maintenance practices. Typical forms of publications include: service bulletins; all-operators' letters; service newsletters; and service digests or magazines. Publications, such as flight manuals and certain maintenance manuals, that are required for FAA type certification or approval are excluded.
- c. "FAA designees" mean Designated Engineering Representatives (DERs), who have delegated authority to approve engineering information, and Delegation Option Authorization (DOA) and Designated Alteration Station (DAS) Authorization holders, who have delegated authority to approve either technical data or supplemental type certificates on behalf of the FAA.

#### 5. DISCUSSION.

- a. Product manufacturers should neither mark an entire service document as "FAA-Approved," "FAA/DER Approved," "DER Approved," etc., nor use any other statement which implies that the service document has been reviewed, evaluated, and

approved in total by the FAA, unless this is, in fact, the case and total FAA approval is required by regulation and has been conferred in accordance with prescribed procedures.

- b. If an action, such as an alteration, parts replacement, repair, etc., is recommended by a manufacturer, and if FAA design approval is required for this action pursuant to the FAR, the manufacturer should indicate a grant of FAA approval in the service document. When this is done:

- (1) The service document should be explicit on what falls within the scope of FAA approval. Example statements follow:
  - (a) "The resultant alteration (or repair) to the affected aircraft described by paragraph XX has been shown to comply with the applicable Federal Aviation Regulations and is FAA Approved;" or
  - (b) "The retirement life limits of paragraph XX have been shown to comply with the applicable Federal Aviation Regulations and are FAA Approved." (Note: Use only when replacement life limits are considered a type certification limitation.)
- (2) Service documents should be neither treated nor represented as the official FAA approval documents, unless either a letter of design approval from the FAA or a record that compliance has been determined by an FAA designee is on file for recommended actions indicated as FAA-approved in service documents.
- (3) Manufacturers should not indicate FAA approval of:
  - (a) Compliance times recommended in service documents (except as indicated in paragraphs 5b(1)(b) and 5c);
  - (b) Background information on the reasons why the recommendations are being made;
  - (c) Recommended maintenance actions, including inspections, that do not require FAA approval in the type certification process; or
  - (d) Detailed instructions (step-by-step) on how to accomplish a manufacturer's recommended and FAA-approved alteration, repair, rework, etc. When these instructions have no possible effect on type design.
- (4) Service document statements regarding approval status should read "FAA-approved" even though FAA designees may have been involved in determining compliance. Terms such as "DER Approved," "FAA/DER Approved," "DOA Approved," etc., should not be used in service documents.

- c. FAA approval of structural repairs and approval for continued

operation with known but safe levels of structural damage may be indicated in a manufacturer's service document. If a statement, such as "The structural repair in paragraph XX is FAA-approved" is employed, it will be contingent on execution of the conditions contained in the FAA-approved portion of the document.

- d. Major deviations to FAA-approved portions of service documents should also be FAA-approved.

M. C. Beard  
Director of Airworthiness

## **Exhibit B**



## EMPENNAGE

The correct name for the tail section of an airplane is empennage. The empennage includes the entire tail group, consisting of fixed surfaces such as the vertical stabilizer and the horizontal stabilizer. The movable surfaces include the rudder, the elevator, and one or more trim tabs. [Figure 1-7]

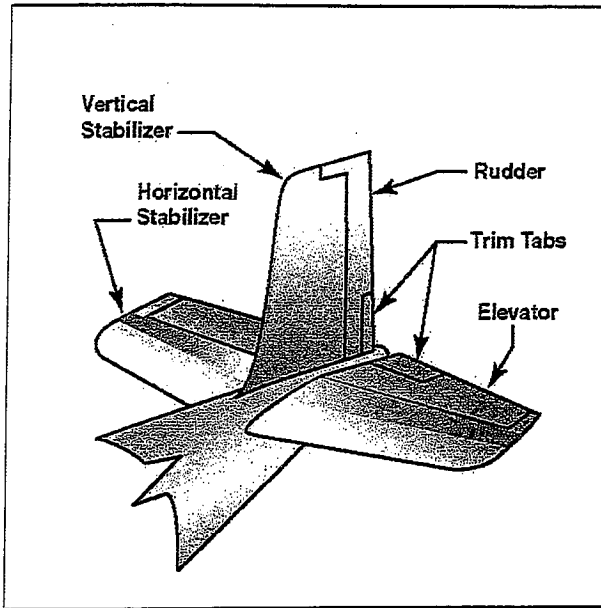


Figure 1-7. Empennage components.

**Empennage**—The section of the airplane that consists of the vertical stabilizer, the horizontal stabilizer, and the associated control surfaces.

A second type of empennage design does not require an elevator. Instead, it incorporates a one-piece horizontal stabilizer that pivots from a central hinge point. This type of design is called a stabilator, and is moved using the control wheel, just as you would the elevator. For example, when you pull back on the control wheel, the stabilator pivots so the trailing edge moves up. This increases the aerodynamic tail load and causes the nose of the airplane to move up. Stabilators have an antiservo tab extending across their trailing edge. [Figure 1-8]

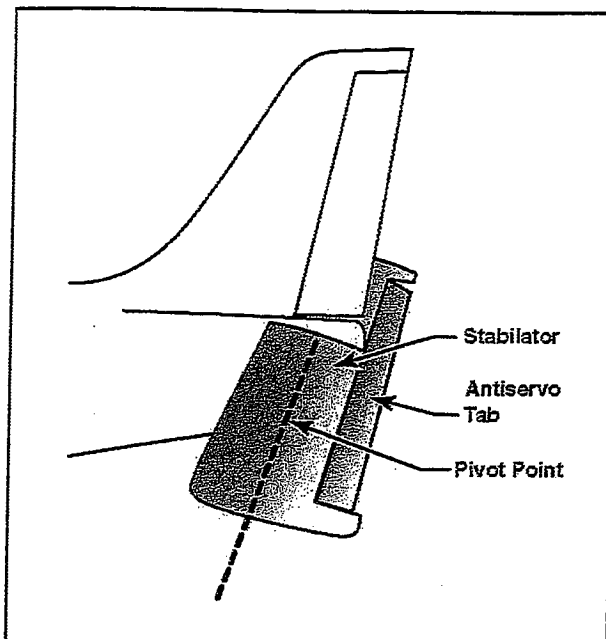


Figure 1-8. Stabilator components.

The antiservo tab moves in the same direction as the trailing edge of the stabilator. The antiservo tab also functions as a trim tab to relieve control pressures and helps maintain the stabilator in the desired position.

The rudder is attached to the back of the vertical stablizer. During flight, it is used to move the airplane's nose left and right. The rudder is used in combination with the ailerons for turns during flight. The elevator, which is attached to the back of the horizontal stablizer, is used to move the nose of the airplane up and down during flight.

Trim tabs are small, movable portions of the trailing edge of the control surface. These movable trim tabs, which are controlled from the cockpit, reduce control pressures. Trim tabs may be installed on the ailerons, the rudder, and/or the elevator.

## **Exhibit C**



# *Dictionary of*

**Third Edition**

# *Aeronautical*

**Compiled and Edited by Dale Crane**

# *Terms*

**Aviation Supplies & Academics, Inc.**  
*Newcastle, Washington*

electronic oscillator tube. The sensor tube used and produced by the mic leak detectors can be of air.

AC electricity.

Normally, we think of electricity, we also consider electrons. Electrons can be materials such as silicon

the voltage. Electronic field-effect transistors indicating instrument, nonelectronic meter,

as it passes through a material to approximately

of valence electrons. This is not the same as the

between two points in space is an important factor

usually goes by the name valve. Electron tubes heated to a high positive

led by the voltage on the cathode and its heater, from which all the electrons may be filled with

um is often plated on the inside to make it hard and direct current power supply, and both metals are

attached to the steel, and

by submerging it in a solution to remove the surface roughness

a capacitor or on an insulation of electrons

electrons on the face of a cathode-ray tube may be on plates placed

If, for example, the top plate is given a positive charge, and the bottom plate a negative charge, the electrons in the beam (all electrons are negative) will deflect away from the lower plate toward the upper plate. The beam will deflect upward.

**electrostatic energy.** Energy stored by an electric stress in the dielectric of a capacitor when two opposing electrical charges act across the dielectric. When a battery is connected across the two plates of a capacitor, electrons are pulled from one plate and forced into the other. When all the electrons that can be moved by the battery have been moved, the capacitor is charged and no more current flows. The battery can be disconnected, but electron pressure still remains between the plates.

This voltage across the dielectric (the voltage on the plates) is caused by electrostatic energy.

**electrostatic field.** The space between two bodies that have opposite electrical charges. Lines of electrostatic force are considered to leave the negatively charged body and enter the body having the positive charge. The strength of the electrostatic field is determined by the number of electrons that make up the charge, and by the square of the distance separating the bodies.

**electrostatics.** The aspect of electricity that deals with electrical charges caused by electrons that are stationary, or not moving. Electrodynamics is the aspect of electricity that deals with electrons in motion.

**elevator (airplane control).** The horizontal, movable control surface in the tail section, or empennage, of an airplane. The elevator is hinged to the trailing edge of the fixed horizontal stabilizer. Moving the elevator up or down, by fore-and-aft movement of the control yoke or stick, changes the aerodynamic force produced by the horizontal tail surface.

**elevator downspring.** A spring in the elevator control system that produces a mechanical force that tries to lower the elevator, and thus the nose of the airplane.

In normal flight this spring force is overcome by the aerodynamic force from the elevator trim tab. But in slow flight with an aft CG position, the trim tab loses its effectiveness and the downspring lowers the nose to prevent a stall.

**elevon (airplane control surface).** A combination elevator and aileron. Elevons are installed on the trailing edge of a delta wing or a flying wing airplane. Fore-and-aft movement of the control yoke causes the elevons to operate together. This causes the airplane to rotate about its lateral, or pitch, axis.

Movement of the stick or control wheel to the right or left causes the elevons to move differentially. The left elevon moves up and the right elevon moves down. Differential movement of the elevons causes the airplane to rotate about its longitudinal, or roll, axis.

**ellipse.** A figure formed when a plane cuts across the axis of a cylinder at an angle other than a right angle.

**ELT (emergency locator transmitter).** A small self-contained radio transmitter carried in an aircraft. If the aircraft crashes, the force of the impact automatically sets the transmitter into operation, transmitting a series of down-sweeping tones on the two emergency frequencies of 121.5 and 243.0 megahertz. Searchers who receive the signal from the ELT are able to locate the wreckage by using radio direction finding equipment.

**emergency (air traffic control).** A distress or an urgency condition.

**emery paper.** An abrasive paper made by bonding a layer of emery dust (pulverized corundum or aluminum oxide) to one side of a sheet of flexible paper. Emery paper is used to polish or clean metal surfaces.

**emery wheel.** An abrasive wheel made by molding a mixture of emery (pulverized corundum or aluminum oxide) and a suitable binder into the form of a wheel. Emery wheels mounted on an arbor and turned by an electric motor can be used to grind metal and shape or sharpen steel tools.



ellipse

## stabilizer

**stabilizer (airplane control surface).** The fixed horizontal tail surface on an airplane. The stabilizer is set on the airplane so it provides the correct amount of stabilizing downward aerodynamic force when the aircraft is flying at its normal cruise speed. The elevators are hinged to the trailing edge of the stabilizer.

**stabilons (airplane control surface).** Small wing-like horizontal surfaces mounted on the aft fuselage of some airplanes to improve longitudinal stability. Stabilons are installed on airplanes that have an exceptionally wide center of gravity range.

**stable isotope.** An isotope of an element that does not undergo radioactive disintegration. An unstable isotope, or radioisotope, emits radioactive energy as it decays.

**stage length.** The distance between landing points in airline operation.

**stage of a compressor (turbine engines).** One disk of rotor blades and the following set of stator vanes in an axial-flow compressor.

**stagger (airplane rigging).** The relationship between the longitudinal location of the two wings of a biplane. If the upper wing is further forward than the lower wing, the airplane has positive stagger; but if the lower wing is ahead of the upper wing, the airplane has negative stagger.

**staggered timing (reciprocating engine ignition).** A method of timing the dual ignition of a reciprocating engine. When the timing is staggered, the spark plug nearest the exhaust valve fires before the spark plug nearest the intake valve.

In some engines, the exhaust gases are not completely scavenged, and they dilute the fuel-air charge in the cylinder. This diluted charge near the exhaust valve burns more slowly than the undiluted charge near the intake valve, and it is therefore ignited earlier.

**stagger wires (airplane rigging component).** High-strength steel wires that connect diagonally fore and aft across the cabane struts of an biplane. Adjustment of the length of the stagger wires determines the fore-and-aft relationship of the upper wing to the lower wing.

**stagnation point (fluid dynamics).** A location on a body in a stream of moving fluid at which the fluid has stopped—it has no velocity. The stagnation point on an airfoil is at the leading edge where the air splits, with some air passing over the top of the airfoil and the rest passing below it.

**stain (finishing material).** A form of nonprotective finish used on wood to color the wood without hiding the grain. After a piece of wood is stained, it is usually covered with varnish to protect it.

**stainless steel.** An alloy of iron, chromium, and nickel that is resistant to rust and corrosion. Stainless steel is more correctly called corrosion-resistant steel.

Neither the 200 series nor the 300 series of stainless steel can be hardened by heat treatment, and the steel in both of these series is nonmagnetic. The 400 series of stainless steel which can be hardened by heat treatment and is magnetic is used for knife blades and razor blades.

**staking.** A method of securing a part in a recess in a metal surface. For example, a disk can be fastened in a counterbored hole by staking the edges of the hole. The disk is put into the hole, and a pointed staking tool is held near the edge of the hole and hit with a hammer. The staking tool forces metal from the edge of the hole over the disk to prevent its from coming out of the hole.

**stall (aerodynamic condition).** An aerodynamic condition in which the angle of attack, the angle at which the relative wind strikes the airfoil, becomes so steep the air can no longer flow smoothly over the airfoil. When an airfoil stalls, it stops producing lift.

**stalled-rotor torque (electric motor characteristic).** The amount of torque produced by the rotor of an electric motor when it is fully energized with the correct voltage, but the rotor is held so it cannot turn.

stall st

ec

ar

co

wi

air

stall wa

of i

me

of t

fusi

sou

S

atta

call

colu

standard

sphe

standard

ditio

atmo

been

entist

work

to alk

all me

same

standard c

age st

mium-

in a spe

contair

electro

with an

volts at

standard d

Civil A

referen

standard-fr

quency

The star

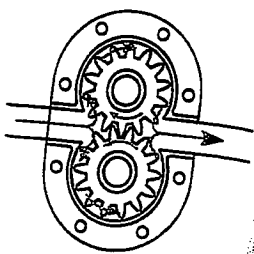
25.0 me

standard-ra

at a rate

speed ai

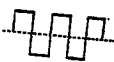
standard ter



gear pump

ve thunderstorms with or  
ach angle in a square is a  
es of a square are parallel.  
bore and stroke have the  
stroke is the distance the  
or one thousandth of an  
d by itself.  
; will give a particular

ating  
axi-  
um  
rms  
the



square-wave  
AC

ges almost instant-  
alue. The voltage al-  
ins constant until it  
le length of time it

ces alternating cur-  
quare-wave AC can

cuts across a sheet  
y sheets are open  
l by energy stored

in aircraft landing  
nfiguration of the  
tion handle being  
alled in the cabin  
is on the ground

specific mode  
/alpha, two on

## stability

**"Squawk ident"** (air traffic control). A phrase used by ATC to request a pilot to activate the ident feature on the aircraft transponder. Activation of the ident feature allows the ground controller to immediately identify the aircraft that is squawking.

**squealer tip (compressor blade tip)**. See profile tip.

**squeegee**. A rubber scraper blade mounted on a handle in such a way that the blade forms a T with the handle. Squeegees are used to move a liquid over a surface. Some of the common uses for squeegees are removing water from a window after the window has been washed, spreading paint through the open fibers in a silk screen, and removing water from a photographic

**squeeze bottle**. A bottle made of a soft plastic material. The contents of the bottle can be forced out through a small opening in the cap by squeezing the sides of the bottle.

**squeeze riveter**. A power riveting tool used to install solid aluminum alloy rivets in a sheet metal structure. The squeeze riveter can be made in the form of a C-clamp or an alligator clamp. One jaw of either type clamp is a fixed part of the riveter frame, and the other jaw is moved against the fixed jaw by the piston in an air cylinder.

The fixed jaw is fitted with a rivet set that fits the manufactured head of the rivet, and the movable jaw is flat. Shims are placed under the rivet set so the jaws come close enough together to form a shop head of the correct thickness. Squeeze riveting is fast, and rivets are more uniform than those driven by a rivet hammer and bucking bar.

**sqelch circuit (radio receiver circuit)**. A circuit in a radio receiver that keeps the volume down when no signal is being received. As soon as a signal is received, the sqelch circuit allows it to come through loud enough to be comfortably heard. Sqelch circuits are used in communications radios that receive long periods of silence between transmissions.

**squib (fire extinguishing system component)**. A small explosive charge that drives a cutter through the seal in a high-rate discharge (HRD) bottle of fire extinguishing agent. The container of fire extinguishing agent is sealed with a thin metal diaphragm. When the operator presses the AGENT RELEASE switch in the cockpit, the squib is ignited. As the squib burns, it produces enough gas pressure to drive a cutter through the metal diaphragm and release the agent into the fire extinguishing system.

**squirrel-cage induction motor**. A type of AC motor whose rotor has current induced into it from stationary field coils. The rotor is made of a stack of soft iron laminations, mounted on a steel rotor shaft. Heavy copper end plates are fastened to the shaft at each end of the stack of laminations. Copper bars fit into slots in the laminations and are welded to each of the end plates.

Changing magnetic fields, caused by AC flowing in the stator windings, induce a large amount of current into the low-resistance bars and the end plates. This current produces a strong magnetic field that reacts with the field in the stator, and the squirrel-cage rotor spins inside the stator. The speed of the rotor is determined by the frequency of the alternating current flowing in the stator windings.

**SRM (Structural Repair Manual)**. A maintenance manual issued by a manufacturer and approved by the FAA that describes, in detail, specific repairs that are approved for a particular aircraft structure.

**stabilator (aircraft primary flight control)**. A single-piece horizontal tail surface on an airplane which serves the purposes of both the horizontal stabilizer and the elevators. A stabilator must have some method of decreasing its sensitivity, and this is done with an antiservo tab on its trailing edge. The antiservo tab automatically moves in the same direction as the stabilator, and the aerodynamic force it produces opposes the movement of the stabilator.

**stability (aircraft flight condition)**. The characteristic of an aircraft that causes it to return to its original attitude after it has been disturbed from this condition.

**stability (meteorology)**. A state of the atmosphere in which the vertical distribution of temperature is such that a parcel of air will resist displacement from its initial level.

## **Exhibit D**



# **MODEL 690C / 690D**

## **MAINTENANCE MANUAL**

**REISSUED: 1 April 1983**

**REVISED: 9 August 2002**

**MODEL 690C MANUFACTURERS SERIAL NO. \_\_\_\_\_**

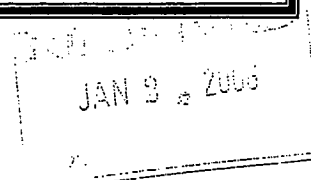
**MODEL 690D MANUFACTURERS SERIAL NO. \_\_\_\_\_**

**REGISTRATION NO. \_\_\_\_\_**

**At the time of issue of this Maintenance Manual, the contents were, to the best of Twin Commander Aircraft Corporation's knowledge, adequate to maintain the aircraft in a continued airworthy condition.**

**There is a supplement, Part No. M690004-2(U.K.), written for this Manual which complies with British Civil Airworthiness Requirements, Section A., Chapter A6-2.**

**19010 - 59<sup>th</sup> Drive NE  
Arlington, WA 98223 USA  
Telephone (360) 435-9797  
FAX (360) 435-1112  
[www.twincommander.com](http://www.twincommander.com)**



**P/N M690004-2**

**GENERAL - STABILIZERS**

**1. Description.** (Refer to Figure 55-1.)

- A. The vertical and horizontal stabilizers are permanently attached to the aft fuselage section. The metal rudder and elevators are attached to the empennage at sealed bearing hinge points. Both the rudder and elevators are equipped with controllable trim tabs. Fillets, fairings, and a tail cone complete the empennage assembly.

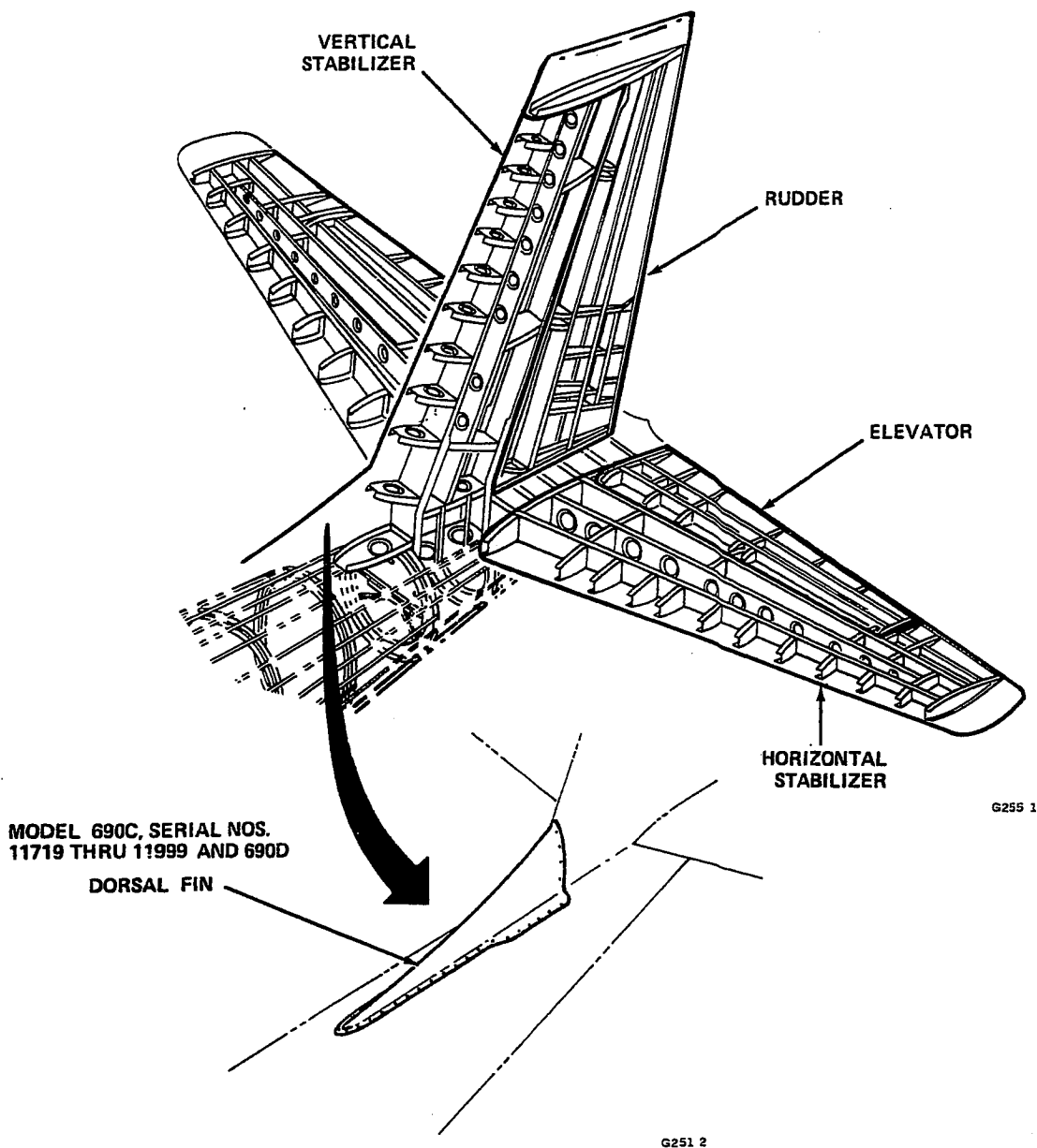


Figure 55-1. Empennage Structure